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Generic Identity and Relationships of the Northeastern Pacific Buccinid Gastropod *Searlesia dira* (Reeve, 1846)

by

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Abstract. The buccinid gastropod genus *Searlesia* Harmer, 1914, contains about a dozen nominal species from the Oligocene to the Pliocene of Europe, with type species *Trophon costifera* S. V. Wood, 1848. Oligocene to Recent species assigned to *Searlesia* from the North Pacific differ consistently from the European species by having an internally lirate aperture and a simple, rather than thickened or reflected, adult lip. The Pacific species are here assigned to the new genus *Lirabuccinum,* with type species *Buccinum dirum* Reeve, 1846, from the northeastern Pacific. Suggestions that *Lirabuccinum* invaded the Atlantic during the Pliocene, when it gave rise to European species of *Searlesia,* are rejected in favor of the hypothesis that the two genera evolved separately in the Atlantic and Pacific oceans respectively and remained confined to the oceans in which they originated. The name *Searlesia dentifera* is here proposed to replace *Searlesia ravni* Schnetler *in* Schnetler & Beyer, 1990, *non* Harmer, 1914.

INTRODUCTION

The genus *Searlesia* Harmer, 1914, was erected to encompass *Trophon costiferum* Wood, 1848, and about a dozen other species from the Pliocene of the North Sea basin and Iceland (HARMER, 1914-1923). All twentieth-century authors have considered *Searlesia* to belong to the Buccinidae. In his initial treatment of the genus in 1914, Harmer alluded to a letter from W. H. Dall in which Dall expressed the view that *Buccinum dirum* Reeve, 1846, a common Recent northeastern Pacific species, should be included in *Searlesia* along with the European Pliocene fossils. DALL (1916, 1918) reaffirmed this assignment of *B. dirum* to *Searlesia* in his review of North Pacific buccinids, and in 1918 he added a second Recent species, *S. constricta* Dall, 1918, from Korea. All subsequent workers have accepted the assignment of *B. dirum* to *Searlesia.* Several additional species from western North America and eastern Asia were subsequently described, with the result that the stratigraphical range of the Pacific members of *Searlesia* came to be regarded as Oligocene to Recent.

Dall probably had no specimens of *Searlesia costifera* with which to compare *Buccinum dirum,* and therefore seems to have relied wholly on the illustrations and descriptions supplied to him by Harmer. This may explain why Dall overlooked, or failed to appreciate, the differences in shell form between the two species, which are superficially very similar.

In order to assess the taxonomic position of the European and Pacific species assigned to *Searlesia,* I examined all type specimens of species referred to *Searlesia* and *Calicantharus* at the U.S. National Museum of Natural History (USNM), Washington, and at the Museum of Paleontology, University of California, Berkeley (UCB). In addition, I examined species of *Pirgos* and related European buccinids at the National Museum voor Natuurlijke Historie (NMNH), Leiden, and species of *Searlesia* and *Calicantharus* at the California Academy of Sciences (CAS), San Francisco. Assignments of Oligocene European species and of fossil Asian species were based on descriptions in the literature. Although the descriptions are adequate for generic assignments, I have not attempted a full-scale review of all described species. Not only were type specimens not available for many of them, but several taxa are based on so few specimens that it would have been impossible to decide on the basis of the available material whether individuals belong to one or a few variable species or to many closely related but phenotypically rather homogeneous species.

In this paper, I shall try to show that the European and Pacific species now generally included in *Searlesia* belong to two lineages with long separate histories, one in Europe

(*Searlesia*), the other in the temperate North Pacific. I propose *Lirabuccinum* [type species: *Buccinum dirum* Reeve, 1846] as a new genus to encompass the latter group. The biogeographical implications of this new interpretation are briefly considered at the end of the paper.

SYSTEMATICS

Genus *Searlesia* Harmer, 1914

Type species: *Trophon costiferum* Wood, 1848.

Description: Shell fusiform; protoconch eroded and therefore unknown; teleoconch whorls somewhat tabulate; axial sculpture of narrowly rounded straight orthocline folds that on the spire whorls extend suture to suture and on the body whorl extend only part of the way toward the base; axial folds variable in number, prominence, and ontogenetic extent; spiral sculpture of numerous thin cords and secondary threads crossing the axial folds; adult outer lip slightly thickened or reflected, smooth within; inner lip weakly concave, smooth; siphonal canal straight, not deflected to the left, not curved upward at end, not distinctly set off from rest of shell; no posterior notch; operculum and animal unknown.

Composition and comparisons: HARMER (1914–1923) assigned 10 species to the genus *Searlesia*, all from the Pliocene of the North Sea basin and from the Pliocene of Iceland (see also GLADENKOV *et al.*, 1980). These species, together with their places and times of occurrence, are listed in Table 1. I have not critically reviewed these species, but I am highly skeptical that they are all distinct. Harmer noted intermediates between some of them, and many were described on the basis of one or two specimens. Many Recent buccinids show great intrapopulational variation in spire height and in the expression of axial sculpture, just the characteristics used by Harmer in distinguishing among his species.

JANSSEN (1979) added *Searlesia mitgaui* (von Koenen, 1867), from the late Oligocene (Chattian) of Germany, to the genus. This species has the outer lip smooth on its inner surface, and bears sculpture similar to that of *S. costifera*. It apparently continued into the early Miocene of Belgium, where it was represented by *Euthria antwerpiensis* Glibert, 1952, a probable synonym of *S. mitgaui* according to JANSSEN (1979).

Two additional Oligocene species have subsequently been added by SCHNETLER & BEYER (1990). *Searlesia konincki* (Nyst, 1845) from the Rupelian of Belgium and Germany and *S. ravni* Schnetler *in* Schnetler & Beyer, 1990, from the late Oligocene (Chattian) of Denmark, share with *S. mitgaui* the presence of a small parietal tooth. This feature is not seen in *S. costifera*. It may be that these three Oligocene species should be referred to a distinct genus or subgenus (see also SCHNETLER & BEYER, 1990). Unfortunately, Schnetler's *S. ravni* is a primary homonym of *S. ravni* Harmer, 1914, a Pliocene species. In view of the tooth on the parietal wall of the Oligocene species, I here propose the replacement name *S.* ***dentifera***, new name, for the Danish species.

Table 1

List of the nominal species of Searlesia.

S. bjornsoni Mörch & Poulsen *in* Harmer, 1914: late Pliocene (Waltonian to Butleyan Red Crags of England, *Serripes* zone of Tjörnes section, Iceland).
S. costifera (Wood, 1848) (type): early Pliocene (Coralline Crag of England; *Mactra* zone of Tjörnes section, Iceland); late Pliocene (Waltonian to Butleyan Red Crags of England; Isle of Man).
S. elegans Harmer, 1914: late Pliocene (Waltonian Red Crag of England).
S. forbesi (Strickland, 1846): late Pliocene (Waltonian Red Crag of England; Isle of Man).
S. harrisoni A. Bell *in* Harmer, 1914; late Pliocene (Isle of Man).
S. konincki (Nyst, 1845): middle Oligocene (Rupelian, western Europe).
S. lundgreni Mörch & Poulsen *in* Harmer, 1914: early Pliocene (*Mactra* zone of Tjörnes section, Iceland); late Pliocene (*Serripes* zone, Tjörnes section, Iceland).
S. mitgaui (von Koenen, 1867): late Oligocene (Chattian, Germany); early Miocene, Belgium.
S. nordmanni Harmer, 1914: late Pliocene (Waltonian Red Crag of England; Isle of Man).
S. oyeni Harmer, 1914: late Pliocene (Isle of Man).
S. proxima Harmer, 1914: late Pliocene (Waltonian Red Crag of England).
S. ravni Harmer, 1914: early Pliocene (Coralline Crag of England); late Pliocene (Waltonian Red Crag of England).
S. ***dentifera*** Vermeij, 1991, new name: late Oligocene (Chattian, Denmark).

The species *Searlesia forbesi* (Strickland, 1846) was said by HARMER (1914–1923) to differ from *S. costifera* and other species of *Searlesia* by the denticulation of the outer lip of the adult. It is unclear from his description and illustrations if this denticulation is in the form of small teeth, which would be discontinuous in the spiral direction, or if they represent spirally continuous lirae. For the time being I regard *S. forbesi* as a *bona fide Searlesia*.

HARMER (1914–1923) doubtfully included *Fusus alveolatus* Sowerby, 1829, and *Trophon consocialis* Wood, 1848, both ranging from the late Miocene to the late Pliocene of the North Sea basin, in his genus *Searlesia*. Previously, however, DE GREGORIO (1885) had erected the genus *Pirgos* [type species: *F. alveolatus*] to encompass these species, and several authors have retained this assignment (VAN REGTEREN ALTENA *et al.*, 1957; GLIBERT, 1963). Harmer was evidently unaware of de Gregorio's taxon *Pirgos*, for otherwise he might have chosen it to include *S. costifera* and related British forms. Species of *Pirgos* differ from *S. costifera* by having more numerous axial ribs and sharper, more distantly spaced spiral ribs, which cross to form a beaded sculpture.

Because of similarities in the ontogeny of spiral and axial sculpture, TEMBROCK (1968) regarded *Pirgos* as a subjective junior synonym of *Scalaspira* Conrad, 1862 [type species: *S. strumosa* (Conrad, 1831, early Pliocene Yorktown Formation, Virginia]. She further suggested that the species previously placed in *Pirgos* belong to a lineage beginning with *S. elegantula* (Philippi, 1843) from the late Oligocene of Germany. The latter species, together with many other species from the Oligocene and Miocene of western Europe, had previously been assigned to *Aquilofusus* Kautsky, 1925 [type species: *A. puggaardi* (Beyrich, 1856)], which TEMBROCK (1968) also synonymized under *Scalaspira*.

In her greatly expanded concept of *Scalaspira,* TEMBROCK (1968) brought together gastropods ranging in age from Eocene to Recent in the Atlantic and from Oligocene to Recent in the North Pacific. In addition to *Pirgos, Aquilofusus,* and the Miocene and Pliocene western Atlantic species of *Scalaspira,* she included in *Scalaspira* the genera *Mohnia* Friele *in* Kobelt, 1878 [type species: *M. mohni* (Friele, 1877)] from the Recent North Atlantic and the Pliocene to Recent of the North Pacific; *Troschelia* Mörch, 1877 [type species: *T. berniciensis* (King, 1846)] from the late Pliocene to Recent of the northeastern Atlantic; and others. In addition, Tembrock included the Pliocene to early Pleistocene Japanese *Searlesia japonica* Yokoyama, 1926, and *S. decessor* Yokoyama, 1928, here regarded as belonging to the new genus *Lirabuccinum* (see below); *Ancistrolepis clarki* Tegland, 1933, from the Oligocene Blakeley Formation of Washington, which is usually assigned to *Ancistrolepis* Dall, 1895 [type species: *A. eucosmius* (Dall, 1891)] or a related genus (see MOORE, 1984; GLADENKOV *et al.,* 1988); and some middle to late Miocene species related to *Sipho gregarius* Philippi, 1846, here tentatively assigned to *Colus* Röding, 1798 [type species: *C. islandicus* (Mohr, 1786)]. All these gastropods have a small first whorl followed by a variable number of whorls with a trellislike sculpture composed of spiral and axial elements (TEMBROCK, 1968). The axial sculpture typically appears a little later than do the spiral cords, and may be absent in some species. Adults of the various species differ greatly in size, sculpture, and length of the siphonal canal. American species of *Scalaspira* have strong spiral cords that form nodes where they cross the narrow axial folds, and have a sharply recurved siphonal canal. Species of *Mohnia* have thin narrow spiral threads and, like members of the *C. gregarius* complex, lack axial sculpture. *Pirgos* shares with *Aquilofusus* the strong spiral cords that form small nodes where they cross the numerous axial ribs. I agree with TEMBROCK (1968) that *Pirgos* and *Aquilofusus* are very closely related. A review of all taxa considered by Tembrock to belong to *Scalaspira* is beyond the scope of this paper, but I suspect that several genus-level groups are involved, of which *Pirgos* (including the subjective junior synonym *Aquilofusus*) is one. Because the protoconch and early teleoconch whorls of *Searlesia* remain unknown, the relationship of that group to the *Scalaspira* complex cannot be assessed. It is noteworthy, however, that all species of *Searlesia* (except perhaps *S. forbesi*) and all of Tembrock's *Scalaspira* (except for two Japanese species here assigned to *Lirabuccinum*) have the outer lip smooth within.

Another related genus is *Euthria* Gray 1850. The Recent Mediterranean species *E. cornea* (Linnaeus, 1758), which is the type species of the genus, lacks apertural lirae, as do several Miocene and Pliocene species from southern Europe. The adult outer lip is thickened and reflected, as in *Searlesia,* but the spiral sculpture is typically very fine and the axial sculpture generally consists of narrow ribs that often become obsolete on later whorls. *Buccinulum* Deshayes, 1830, is often regarded as at most subgenerically distinct from *Euthria* (PONDER, 1971). Most of the Australian and New Zealand species of *Buccinulum,* including its type species *B. lineum* (Martyn, 1784), have a lirate aperture (see below).

In summary, *Searlesia* is a European genus with a range of early Oligocene to late Pliocene, with a gap in the record in the middle and late Miocene. I regard *Searlesia* as distinct from, but perhaps related to, *Pirgos* and perhaps other taxa in Tembrock's broadly conceived version of *Scalaspira.*

Genus ***Lirabuccinum*** Vermeij, gen. nov.

Type species: *Buccinum dirum* Reeve, 1846.

Diagnosis: Shell fusiform, spire approximately half the total shell height; spiral sculpture of fine threads, increasing in width toward base; threads override wide, rounded, low, often slightly oblique axial folds that extend suture to suture in the spire whorls; on body whorl, axials fade out toward base; axials often obsolete on part or all of body whorl; outer lip simple, neither thickened nor reflected, lirate within, the number of lirae corresponding with the number of external spiral threads; siphonal protuberance short, deflected slightly to left, slightly recurved dorsally, not distinctly set off from rest of shell; inner lip smooth, with single weak basal fold.

Composition and comparisons: In shape and sculpture, *Lirabuccinum* (Figure 1C, D) closely resembles *Searlesia* (Figure 1A, B), such that it is easy to see why Dall and others have considered the European fossil species and the North Pacific species to belong to the same genus. Both have fusiform shells with broad axial folds and fine spiral threads. This combination of traits is, however, widespread in the Buccinidae and in related families, and is by itself hardly diagnostic.

Lirabuccinum differs from *Searlesia* in at least four ways. The inner surface of the outer lip in *Lirabuccinum* is lirate, whereas in *Searlesia* it is smooth. The outer lip in *Lirabuccinum* is thin and unreflected, whereas in adult *Searlesia* it is thickened or somewhat reflected. In *Lirabuccinum,* the siphonal canal is short and slightly twisted to the left, as well as dorsally deflected; in *Searlesia,* it is straight and not recurved. Finally, the axial folds of *Lirabuccinum* are broader and somewhat more oblique in orientation than are the orthocline, more sharply rounded axials of *Searlesia.*

Another genus that is morphologically similar to *Lira-*

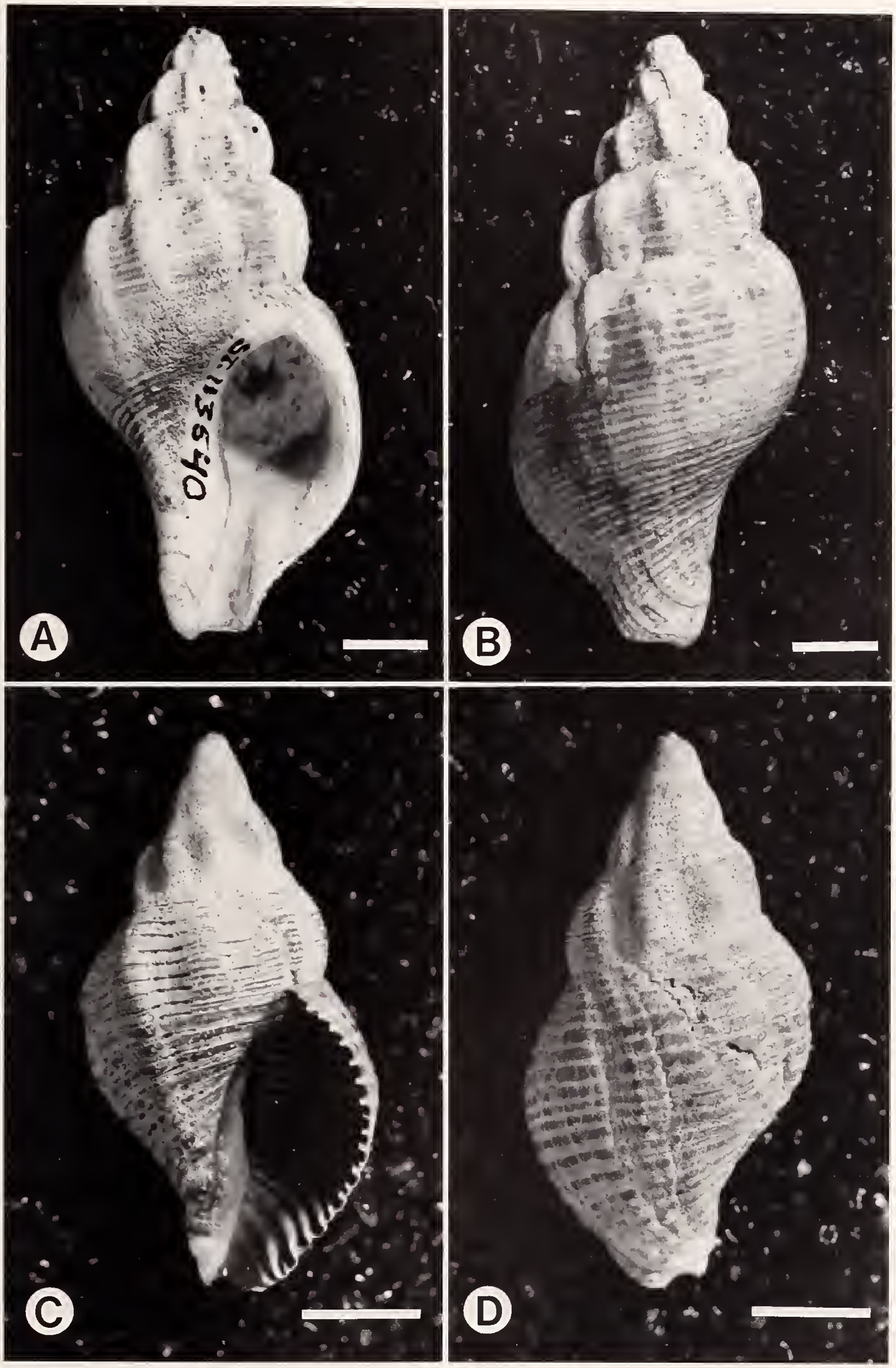

Figure 1

A and B. *Searlesia costifera* (Wood, 1848), Ellewoudsdijk, Zeeland, Netherlands, beach drift (NMNH); apertural and dorsal views. C and D. *Lirabuccinum dira* (Reeve, 1846), Whiffen Spit, Sooke, Vancouver Island, British Columbia (Vermeij collection); apertural and dorsal views. Scale bar: 1 cm.

buccinum is *Calicantharus* Clark, 1938 [type species: *C. fortis* (Carpenter, 1866)], known from the Paleocene or Eocene to the Pleistocene of western North America. Species of *Calicantharus* differ from *Lirabuccinum* by the presence of a concave area below the suture on the body whorl, an angulation or rounded swelling on the body whorl below this concave area, the smooth rather than lirate inner surface of the outer lip, and by the axial sculpture, which is expressed as axially elongated knobs or nodes rather than as continuous axial folds as in *Lirabuccinum.*

ADDICOTT (1970) assigned *Turris carlsoni* Anderson & Martin, 1914, which was included in *Searlesia* by ADEGOKE (1969) and questionably in that genus by MOORE (1963), to *Calicantharus.* This species, which occurs in the Miocene Astoria Formation of Oregon, has a concave subsutural area, a swelling below this concave area, and axial sculpture usually consisting of nodes that are most prominent on the swelling. The aperture of most specimens cannot be inspected because of the presence of matrix, but some broken specimens in the collections at UCB reveal a smooth interior. The assignment of *T. carlsoni* to *Calicantharus* therefore seems reasonable.

I disagree with ADDICOTT (1970) that *Searlesia dira miocenica* Etherington, 1931, from the Astoria Formation of Grays Harbor, Washington, is a dwarf or juvenile form of *Calicantharus kernensis* (Anderson & Martin, 1914). Etherington's taxon closely resembles the living *Lirabuccinum dirum* in sculpture. Although the apertures of both the holotype and paratype at UCB are filled with matrix, the holotype shows distinct crenulations on the outer lip, indicating the presence of internal lirae. The whorls are evenly convex, and the distinct subsutural concavity is lacking despite ETHERINGTON'S (1931) claim to the contrary. I therefore agree with ETHERINGTON (1931) that this taxon is very close to the living *L. dirum,* and I place it in *Lirabuccinum. Calicantharus kernensis* from the Jewett Sand (early Miocene) of California is a typical *Calicantharus* with a smooth outer lip, subsutural concave area, and weakly developed nodes.

WOODRING & BRAMLETTE (1950) considered *Chrysodomus portolaensis* Arnold, 1908, from the upper Etchegoin and lower Purisima Formations of the Pliocene of California, as a species of *Calicantharus.* Inspection of the holotype at the USNM and of several lots at CAS, however, revealed that the axial sculpture (though absent on the body whorl) is expressed as continuous if bulging folds in the spire whorls, and that the inner surface of the outer lip is lirate. I therefore agree with GRANT & GALE (1931) in placing this species in their *Searlesia* (= *Lirabuccinum* herein).

Several other fossil species from the northeastern Pacific have been allocated to *Searlesia* by previous authors. *Searlesia dira* Clark, 1918, from the San Ramon Sandstone (Oligocene) of California, and *S. branneri* Clark & Arnold, 1923, from the Sooke Formation (early Miocene) of British Columbia, have regularly convex whorls and continuous axial folds disposed somewhat obliquely on the body whorl. Although the aperture cannot be observed in the available specimens at UCB, assignment to *Lirabuccinum* is plausible. MOORE (1963) suggested that *Turris cammani* Dall, 1909, and *T. coosensis* Dall, 1909, both from the Empire Formation (late Miocene) of Oregon, belong to *Searlesia. Turris cammani* has a distinct posterior notch and lacks axial sculpture; it does not appear to be a buccinid. *Turris coosensis* lacks a posterior notch and possesses axial folds overridden by about 18 strong spiral threads separated by narrow grooves, but the holotype (the only available specimen at USNM) is missing the spire and the anterior canal, and its aperture is filled with matrix. This species may belong to *Lirabuccinum,* but I prefer to regard it as taxonomically indeterminable. *Searlesia olympicensis* Durham, 1944, from the Quimper Sandstone (Oligocene) of Washington, has a very short spire and differs from all species of *Lirabuccinum* by lacking axial sculpture. The apertural features of the unique holotype at UCB cannot be observed, but the absence of axial sculpture and the very short spire place this fossil outside the limits of *Lirabuccinum* as here defined.

In the western Pacific, seven taxa have been assigned by previous authors to *Searlesia. Fusus modestus* Gould, 1846, and its subspecies *fuscolabiata* (Smith, 1875) resemble small *Lirabuccinum dirum* in form and in having unusually strong axial folds. *Searlesia constricta* Dall, 1918 (Recent, Korea) and *Fusus coreanicus* Smith, 1875 (warm-temperate western Pacific) are superficially similar to *L. modestum* and may well belong to a single somewhat variable Recent species. Fossil taxa described as *Searlesia* from the western Pacific include *S. japonica* Yokoyama, 1926, and *S. decessor* Yokoyama, 1928, from the Pliocene of Japan, and *S. kavranensis* Sinelnikova *in* Gladenkov *et al.,* 1984, from the Ilinsk Suite (middle Miocene) of Kamchatka. All these species have a lirate outer lip and possess axial folds, and therefore appear to belong to *Lirabuccinum.* AMANO (1983) has, in addition, pointed to an unidentified species from the Togeshita Formation (early Miocene) of Hokkaido. Finally, *Searlesia iljinensis* Sinelnikova *in* Gladenkov *et al.,* 1984, from the Ilinsk Suite of Kamchatka, was excluded by GLADENKOV *et al.* (1988) from *Searlesia* (= *Lirabuccinum* of this paper) on account of its smooth outer lip. GLADENKOV *et al.* (1988) place *S. iljinensis* in *Plicifusus* Dall, 1902 [type species: *P. kroeyeri* (Möller, 1842)].

It is likely that many of these names are synonyms of one or a few somewhat variable species, because the purported differences are not great. *Searlesia kavranensis* is said to have less regular spiral sculpture and a shorter spire than the approximately coeval *Lirabuccinum branneri* (see GLADENKOV *et al.,* 1984). The expression of spiral sculpture, however, may depend on the shell's state of preservation. YOKOYAMA (1926), for example, pointed out that the spiral ribs on slightly eroded specimens of *L. japonicum* have a tripartite appearance not seen in well-preserved shells. *Lirabuccinum branneri* was said by CLARK & ARNOLD (1923) to differ from *L. dirum* in that the axial folds extend onto the body whorl, whereas in *L. dirum* and in *L. portolaense* they are confined mainly or entirely to the spire whorls. As in other axially sculptured buccinids and related groups, there is considerable intrapopulational variation in the expression of axial sculpture in *L. dirum*. Some large *L. dirum* have axial folds on the whole of the body whorl, whereas others lack folds on this part of the shell. In the northeastern Pacific, therefore, a case could be made that there is a single somewhat variable species of *Lirabuccinum* that appeared as early as the early Miocene. The number and limits of species of *Lirabuccinum* cannot be decided definitively without more extensive fossil material than is now available.

A list of the nominal species of *Lirabuccinum* is given in Table 2. The 12 taxa range in age from Oligocene to Recent in the eastern Pacific, and from early Miocene to Recent in the western Pacific.

Table 2

List of the nominal species of *Lirabuccinum*.

L. dirum (Reeve, 1846) (type): Pleistocene to Recent, northeastern Pacific.
L. branneri (Clark & Arnold, 1923): early Miocene (Sooke Formation, British Columbia).
L. constrictum (Dall, 1918): Recent, Korea.
L. coreanicum (Smith, 1875): Pliocene to Recent, East Asia.
L. dalli (Clark, 1918): Oligocene (San Ramon Sandstone, California).
L. dirum miocenicum (Etherington, 1931): late Miocene (Empire Formation, Washington).
L. decessor (Yokoyama, 1928): Miocene (Moriya Formation) Pliocene or early Pleistocene.
L. japonicum (Yokoyama, 1926): Pliocene or early Pleistocene (Sawane and Omma formations).
L. kavranense (Sinelnikova *in* Gladenkov *et al.*, 1984): early Middle Miocene (Ilinsk Suite, Kamchatka).
L. modestum (Gould, 1846): Pliocene or early Pleistocene to Recent, Japan.
L. portolaense (Arnold, 1908): Pliocene (Etchegoin and Purisima formations, California).
L. sp. of Amano, 1983: early Miocene (Togeshita Formation, Hokkaido).

RELATIONSHIPS AND BIOGEOGRAPHY

We are still far from an evolutionary understanding of the Buccinidae and related families. This is well reflected in uncertainties surrounding the scope and limits of the family (Ponder & Warén, 1988) and in the difficulties of assigning many deep-sea species to family units (Bouchet & Warén, 1986). My purpose here is to review the taxonomic distribution within the Buccinidae of some of the characters that distinguish *Searlesia* from *Lirabuccinum*, and to consider the biogeographical implications of these differences.

Lirabuccinum is one of only two genera of cool-water northern Buccinidae with a lirate outer lip. The other genus is the northwestern Pacific *Barbitonia* Dall, 1916 [type species: *B. arthritica* (Bernardi, 1858)], ranging in age from Miocene to Recent. This taxon has traditionally been regarded as a subgenus of *Neptunea* Röding, 1798 [type species: *N. antiqua* (Linnaeus, 1758)] (see Dall, 1916, 1918; Habe & Sato, 1973; Goryachev, 1987). Nelson (1978), however, concluded on the basis of shell microstructure that *Barbitonia* is not closely allied to *Neptunea*, but instead belongs to the group that Powell (1951) referred to as the Buccinulidae, and that others regard as at most a subfamilial unit Buccinulinae. The Buccinulinae includes many tropical species as well as the majority of cool-water Southern-Hemisphere buccinids. Among the genera included in this group are *Buccinulum* Deshayes, 1830 [type species: *B. lineum* (Martyn, 1784)] from the late Oligocene or early Miocene to the Recent of New Zealand and Australia (Ponder, 1971; Beu & Maxwell, 1990); *Siphonalia* A. Adams, 1963 [type species: *S. cassidariaeformis* (Reeve, 1846)] from the Eocene to the Recent of east Asia (Ruth, 1942; Gladenkov *et al.*, 1988); *Kelletia* Fischer, 1884 [type species: *K. kelletii* (Forbes, 1850)] from the Paleocene to the Recent of the eastern Pacific (Ruth, 1942); *Penion* Fischer, 1884 [type species: *P. dilatatus* Quoy & Gaimard, 1833)] and related genera, from the Paleocene to the Recent of New Zealand and Australia (Ponder, 1973; Beu & Maxwell, 1990); *Lirabuccinum*, from the Oligocene to the Recent of the North Pacific; and the North Atlantic genera in the complex of *Scalaspira*, *Searlesia*, and *Euthria*. Powell (1951) further includes in his Buccinulidae almost all other cool-water Southern-Hemisphere buccinids. Lirae occur in *Buccinulum*, *Siphonalia*, *Kelletia*, *Penion*, and *Lirabuccinum*, among others, but not in the Atlantic complex discussed above under *Searlesia*, nor in most cold southern forms. With a few exceptions, "buccinulid" genera are constant with respect to the presence or absence of lirae. The exceptions occur in the tropical deep-sea genera *Manaria* Smith, 1906 [type species: *M. thurstoni* Smith, 1906], most of whose species are lirate, and *Eosipho* Thiele, 1929 [type species: *E. smithi* (Schepman, 1911)], most of which lack lirae (see Bouchet & Warén, 1986). Generic assignments in *Manaria* and *Eosipho* were regarded by Bouchet & Warén (1986) as tentative. Although a close relationship may exist between lirate and nonlirate genera, such as *Buccinulum* and *Euthria* (Ponder, 1971), it is possible that the lirate condition was stable once it evolved. Such a scenario could, for example, support Ponder's (1973) contention that the lirate *Penion* and *Kelletia* are closely related, and support Powell's (1951) hypothesis that *Searlesia dira* (= *Lirabuccinum*) is derived from a Southern-Hemisphere stock perhaps related to *Buccinulum*. Alternatively, there could be a link between *Lirabuccinum* and *Siphonalia*. Until we know more about phylogenetic relationships within the Buccinidae, nothing definitive can be said about how closely related *Lirabuccinum* is to *Searlesia*. However, given that several morphologically similar lirate groups occurred in the Pacific before the time of origin of *Lirabuccinum*, and that many nonlirate taxa from which *Searlesia* could be derived were present in the Atlantic at or before the time of origin of *Searlesia,* I suggest that *Lirabuccinum* and *Searlesia* evolved independently within their respective oceans. Similarly, it is unnecessary to link the smooth-lipped eastern Pacific *Calicantharus* and *Eosiphonalia* Ruth, 1942 [type species: *E. washingtonensis* (Weaver, 1916); Paleogene of Washington, Oregon, and California] with *Lirabuccinum.*

Given the far-reaching similarity in form and sculpture between European and North Pacific species previously included in *Searlesia,* some investigators might elect to perpetuate the *status quo* notwithstanding the small but consistent differences between *Searlesia* s.s. and the new genus *Lirabuccinum.* If this course were followed, however, the name of the inclusive genus could not be *Searlesia* because, as argued above, the immediate likely ancestors of the Pacific and Atlantic groups are best allocated to such genera as *Buccinulum, Siphonalia,* and *Euthria.* If *Searlesia* s.s. arose from *Euthria*-like ancestors with a nonlirate aperture, and if *Lirabuccinum* came from a lirate *Buccinulum*-like group, one could unite the Pacific and Atlantic branches in *Buccinulum* s.l., of which *Euthria* would be a distinct subgenus. The precise choice of names is, I believe, less important than the argument that the North Pacific and North Atlantic species previously brought together under *Searlesia* represent two independent lineages. The establishment of the genus-level taxon *Lirabuccinum* more accurately reflects this hypothesis of independent descent than do other possible schemes of classification.

The clarification of the relationships and taxonomy of *Searlesia* and *Lirabuccinum* is of more than routine biogeographical interest. As conceived by Dall (1916, 1918) and most other authors, *Searlesia* had representatives in both the North Pacific and North Atlantic oceans. Given that *Searlesia* in Europe was known only from the Pliocene and that *Searlesia* in the Pacific was soon discovered to extend back to the Miocene and Oligocene, *Searlesia* has been regarded as an invader from the Pacific to the Atlantic via the Arctic (Davies, 1929; Durham & MacNeil, 1967; Vermeij, 1989). The reinterpretation advocated here radically revises this biogeographical history. Neither the true Atlantic *Searlesia* nor the convergent Pacific *Lirabuccinum* participated in the trans-Arctic interchange, and there was no geographical restriction of *Searlesia* to the Pacific as Vermeij (1989) inferred. Instead, the two groups evolved independently and remained confined to the Pacific and Atlantic basins. Both groups can be traced back to the Oligocene. *Searlesia* apparently became extinct at the end of the Pliocene in Europe, whereas *Lirabuccinum* is still living, being represented by vicariant species on the American and Asian sides of the temperate North Pacific.

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